IOSR Journal Of Environmental Science, Toxicology And Food Technology (IOSR-JESTFT)
ISSN: 2319-2402, ISBN: 2319-2399. Volume 1, Issue 5 (Nov. - Dec. 2012), PP 44-46
www.Iosrjournals.Org

Monitoring Of *Helicoverpa Armigera* (Hubner) (Lepidoptera: Noctuidae) Through Pheromone Traps In Chickpea (*Cicer Arietinum*) Crop And Influence Of Some Abiotic Factors On Insect Population.

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Abstract: *Monitoring of Helicoverpa armigera (Hubner) male moths through pheromone traps was carried out in chickpea crop field at village Kapren, dist. Bundi during 2011-12. Maximum number of male moths trapped were 105.66/trap/week, while maximum number of larvae was 30.0/10 plants recorded during 12th standard week (19 March -25 March). Abiotic factors like maximum temperature and minimum temperature had positive correlation with male moth catches and larval population of Helicoverpa armigera while, relative humidity had negative correlation with male moth catches and larval population of Helicoverpa armigera.*
Key words*: Pheromone trap, Helicoverpa armigera ,Integrated Pest Management, Abiotic factors.*

I. Introduction:

Chickpea is an important pulse crop of India, known as king of pulses. Insect pests are major threat to agricultural production. *Helicoverpa armigera* is a polyphagous insect pest of many agricultural and horticultural crops across the world (Fitt, 1989), because of its high fecundity, migratory behavior, high adaptation to various climatic conditions and development of resistance towards wide range of insecticides. However it is a polyphagous insect pest but chickpea is its most preferred host (Tripathi and Sharma, 1985). Recent climatic changes have also influenced the population of *Helicoverpa armigera* in different crops (Srivastava, 2009). Pheromone traps are the important component in integrated pest management programme, for monitoring its population. Present investigation was carried out to monitor population of *Helicoverpa armigera* and its relationship with abiotic factors such as minimum, maximum temperatures and relative humidity.

II. Material and Methods:

For monitoring of *Helicoverpa armigera* through pheromone traps, investigation was conducted at village Kapren of district Bundi, Rajasthan in chickpea crop field during 2011-12. For this purpose three pheromone traps were installed in the field with the help of bamboo sticks at 2.0 m height above the ground level. The male moth of *Helicoverpa armigera* were attracted towards pheromone trap and slipped into plastic polythene bag through the funnel. Observations on male moth catches were recorded daily from 17th December to 8th April 2012. Pheromone lure was replaced by a new one at every 14 days interval. Observations on larval population were recorded at weekly interval from ten randomly selected plants. The relationship between abiotic factors, male moth catches and larval population was calculated by using simple correlation co-efficient formula.

III. Result and Discussion:

Table: 1 shows that first trap catch of male moth of *Helicoverpa armigera* as recorded during 6th standard week (Feb. 05th-Feb. 11th) was 12.33 moths/trap/week which increased gradually and reached its peak (105.66 moths/trap/week) during 12th standard week (March 19th-March 25th) and soon after decreased to 31.66 moths/trap/week in 14th standard week (April 2nd – April 8th). Almost similar kind of observations were observed by Shah and Shahzad. (2005), who reported its low population during 49th to 6th standard weeks but increased from 7th standard week onwards and declined again during 14th standard week. Mahapatra *et al.* (2007) observed higher number of moths trapped during March and April months. Present findings were in favour of Anonymous (1988) who reported that incidence of *Helicoverpa armigera* commenced during mid January, increased gradually in the month of February and reached on peak at the end of March, then decreased rapidly within two weeks onward.

In the present work, adult male moth catches remained zero from 51st to 05th standard week, however incidence of larval population was commenced much earlier (2.33 larvae/10 plants) from 2nd standard week (Jan. 08th- Jan.14th) and reached its peak (30.0 larvae/plants) on 12th standard week. Anwar *et al.* (1994) also reported high larval population during February and March.

Table 2 shows correlation between abiotic factors (minimum ,maximum temperatures and relative humidity) and male moth trap catches and larval population of *Helicoverpa armigera* . Present findings revealed that adult male moth catches in pheromone traps positively correlated (r=0.77 and r=0.63) with maximum and minimum temperatures, while it was negatively correlated (r= -0.79) with relative humidity. Similar kind of observations were also recorded by Rothschild *et al.*(1981), Yadav and Lal (1988), Deshpande and Khan (1990), Yadav *et al.*(1991), Venkataiah and Subbaratnam (1992), Lal (1996), Gour (1997), Ganguli *et al.* (1998), Metange *et al.*(2004). However Upadhyay *et al.*(1989) reported positive correlation with maximum temperature (r=0.63) and minimum temperature (r=0.67) as well as relative humidity(r=0.59).

Correlation between larval population and abiotic factors (minimum, maximum temperatures and relative humidity) was recorded as r=0.69, r=0.77 and r= -0.89 respectively.

Minimum and maximum temperatures were positively correlated with larval population build up, while it was negatively correlated with relative humidity. These findings are in favour of Sharma *et al.* (2005) who reported minimum and maximum temperatures (r=0.828 and r=0.808) were positively correlated, while morning and afternoon relative humidity (r=-0.725 and r=-0.595) were negatively correlated. In present investigation correlation between male moth catches and larval population was r=0.8329 recorded.

Table 1 Pheromone trap catches and larval poulation of *Helicoverpa armigera* at Kapren (Bundi) during 2011-2012.

Standard Week	Period	Mean temperature (ºC)		% Relative Humidity	Average no. of male Moths /trap/week	Average no. of larvae/10 plants
		Minimum	Maximum			
51	Dec. 17- Dec.23	7.61	24.15	71.00	0	0.00
52	Dec. 24- Dec. 31	7.62	21.84	77.12	0	0.00
01	Jan. 01- Jan. 07	9.92	20.50	91.28	0	0.00
02	Jan. 08- Jan. 14	5.75	19.78	79.71	0	2.33
03	Jan. 15- Jan. 21	6.74	21.16	71.43	0	5.00
04	Jan. 22- Jan. 28	6.89	20.61	73.71	0	9.00
05	Jan. 29- Feb. 04	6.65	20.67	71.71	0	13.33
06	Feb. 05- Feb. 11	7.78	21.02	60.86	12.33	16.33
07	Feb. 12- Feb. 18	9.35	23.19	63.71	15.66	18.33
08	Feb. 19- Feb. 25	11.79	28.47	56.57	23.66	17.66
09	Feb. 26- Mar. 04	10.74	26.73	51.50	15.00	17.66
10	Mar. 05-Mar. 11	12.53	29.04	38.29	54.66	19.00
11	Mar. 12-Mar. 18	12.63	29.56	49.57	73.00	25.33
12	Mar. 19-Mar. 25	14.06	32.74	42.29	105.66	30.00
13	Mar. 26-Apr. 01	17.36	36.99	37.71	79.66	26.00
14	Apr. 2-Apr. 08	23.12	38.13	38.00	31.66	23.66

Table 2: Correlation co-efficient between weather parameters, male moth catches and larval population of *Helicoverpa armigera* at Kapren (Bundi) during 2011-2012.

	Minimum temperature	Maximum temperature	Relative humidity
Moths	0.6382	0.7778	-0.7952
Larvae	0.6995	0.7759	-0.8908

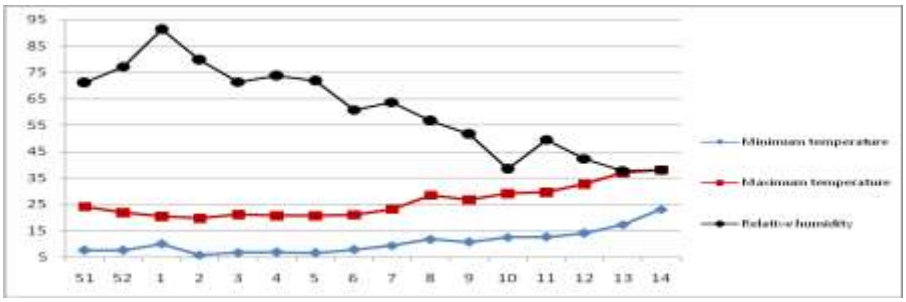

Figure 1: Fluctuations in weather parameters at Kapren (Bundi) during 2011-2012.

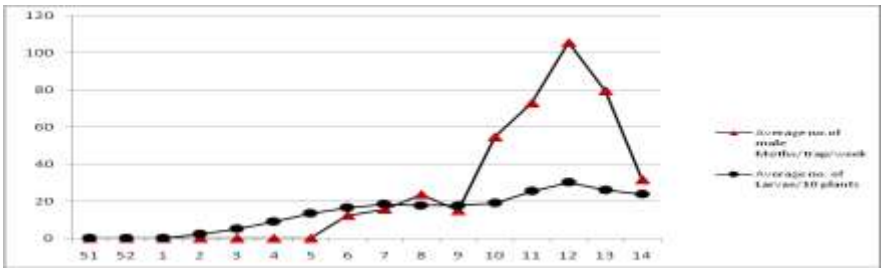

Figure 2: Pheromone trap catches of male moths and larval population of Helicoverpa armigera at Kapren (Bundi) during 2011-2012.

IV. Coclusion:

Squeeze of present study is that pheromone traps are important tool for monitoring of *Helicoverpa armigera* population. In the present study peak trap catches of male moth are indications of high larval population in the field and control measures through integrated pest management techniques without indiscriminate use of insecticide may be implemented immediately.

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